characterized by the dryness, sunshine, light rainfall, extreme seasonal differences, and large diurnal temperature ranges of a mountain climate.

Third. The Pacific coast zone, with a mild and equable climate, due to the prevailing westerly winds from the neighboring ocean, and with marked latitudinal and seasonal variations in rainfall.

Professor Ward adds a brief but useful bibliography.—*F. O. S.*

THE THIRD CONVENTION OF WEATHER BUREAU OFFICIALS.

Peoria, Ill., was chosen for the meeting place of the Third Convention of Weather Bureau Officials, held on the 20th, 21st, and 22d of September of this year. Sixty-five officials of the Bureau, from every section of the country, were in attendance. The following papers were presented:

President's address.—Prof. Willis L. Moore.

Laboratory work in meteorology.—Prof. A. G. McAdie, San Francisco, Cal.

The Mount Weather Research Observatory.—Prof. F. H. Bigelow, Washington, D. C.

A symposium on the purposes of the Mount Weather Research Observatory.

Errors of instruments and the lines along which improvements should be sought.—Prof. C. F. Marvin, Washington, D. C.

Long-range weather forecasts.—Prof. E. B. Garriott, Washington, D. C.

Seasonal forecasts.—Prof. A. G. McAdie, San Francisco, Cal.

Amplification of forecasts for the benefit of perishable products.—Dr. W. M. Wilson, Milwaukee, Wis.

An aid in forecasting.—Mr. F. H. Brandenburg, Denver, Colo.

Report of board on revision of meteorological forms.

Forecasting fogs on the Gulf coast.—Mr. B. Bunnemeyer, Providence, R. I.

A popular account of the countercurrent theory of storms.—Prof. F. H. Bigelow, Washington, D. C.

Variations in insolation and in the polarization of blue sky light during 1903 and 1904.—Mr. H. H. Kimball, Washington, D. C.

A possible method for determining the direction and velocity of storm movement.—Mr. E. H. Bowie, St. Louis, Mo.

Temperature forecasts and iron ore shipments.—Mr. H. W. Richardson, Duluth, Minn.

Distribution of forecasts by telephone.—Dr. G. M. Chappel, Des Moines, Iowa.

Practicable rules for forecasting flood crest stages for Cairo, Ill.—Mr. P. H. Smyth, Cairo, Ill.

The Columbia River.—Mr. E. A. Beals, Portland, Oreg.

Diurnal periodicities in the climate of Baltimore.—Dr. C. L. Fassig, Baltimore, Md.

Instruction and research by Weather Bureau officials.—Prof. Cleveland Abbe, Washington, D. C.

A symposium on the teaching and position of meteorology in universities and other institutions.

Phenological observations at Wauseon, Ohio.—Mr. J. Warren Smith, Columbus, Ohio.

A study of rainfall on the west Florida coast.—Mr. B. Bunnemeyer, Providence, R. I.

Climatology of Porto Rico.—Mr. W. H. Alexander, Galveston, Tex.

Monthly statement of averages for rural press.—Mr. W. S. Belden, Vicksburg, Miss.

Irregularities in frost and temperature in neighboring localities.—Dr. I. M. Cline, New Orleans, La.

Former conventions of Weather Bureau officials.—Mr. James Berry, Washington, D. C.

A full report of the convention will be published as a bulletin of the Weather Bureau.

OBSERVATIONS FOR TWELVE MONTHS IN LASSA.

Climatic data from the forbidden city of Tibet has been obtained by M. Tysbikov, a Russian traveler, who resided in Lassa from August 15, 1900, until August 22, 1901. The following summary of his observations is taken from La Géographie, vol. 9, No. 1.

The year is divided into two seasons, the dry and the wet. (The influence of the monsoons of the Indian Ocean is felt even at this point.) In 1900 the dry season began toward the end of September; up to the end of April snow fell only twice. The rains began toward the middle of May, and 48 rainy days were counted up to the middle of September. The direction of the winds is in general from west to east. The mean temperature in the shade, observed three times a day during 235 consecutive days, is 5.2° C. at dawn, 14.5° at 1 p. m., and 9° at 9 p. m. The coldest month is December (mean for the three observations respectively —7.6°, +1.40°, —2.9°); the warmest month is June (14.6°, 22.8°, 17.2°). The large streams never freeze; the small ones are covered with only a thin layer of ice.

OBSERVATIONS AT THE FRANCO-SCANDINAVIAN STATION FOR AERIAL SOUNDINGS.

In a previous number of the REVIEW[1] Mr. Leon Teisserenc de Bort has described the station for systematic and continuous kite work, established by the cooperation of the French, Danish, and Swedish meteorological services at Hald, near Viborg in Jutland. In a recent communication to the Paris Academy of Sciences, Mr. Teisserenc de Bort gives some of the results of this work.[2]

Besides the meteorological observations, properly so called, a series of measurements of insolation have been made by Messrs. Holm and Jansson, our Swedish colleagues, with the Ångström pyrheliometer The maximum insolation, 1.314 small calories, was observed in July.

The barometric depressions, of slight extent, which pass over Jutland, are preceded by a change to the south in the lower wind, this movement taking place without any change in the upper currents. The rotation of the wind therefore begins in the lower levels and then rises into the region of the cumulus and the alto-cumulus. The temperatures obtained by the sounding balloons are not notably lower in the winter season than those that are obtained in the neighborhood of Paris; but we should note the very great decrease of temperature (0.9° per 100 meters) indicated on March 15, 1903, by a balloon that recorded a temperature of —38° at an altitude of 4400 meters, while a balloon sent up on the same day near Paris recorded only —17°. The day before, the temperature at the same height was about —16°, both at Hald and at Paris. The temperatures at the earth varied but 2° between these two days, while in the upper atmosphere they decreased more than 22°. This is a striking example of the now recognized fact that the variability of climate is greater at a certain height than near the ground.

Observations by kites have shown that in a great number of cases, even with rather low pressures, the winds from southwest to northwest diminish in velocity at a certain height. Sometimes this diminution has been gradual and in proportion to the increase in altitude; sometimes the wind remained quite strong or even increased in certain zones, especially in the neighborhood of cloud layers, and then fell suddenly to so low a velocity that the kites were arrested in their upward movement as if by an invisible ceiling.

It has been several times observed that such an increase in the wind as threatened to break the kite line has been followed by so marked a calm that the kites fell to the ground, with all the line, from a height of more than 1000 meters.

These facts, and others observed by us at Trappes and on the Mediterranean, show that we can not theorize on atmospheric phenomena as if they were continuous in time or space; such cases, on the contrary, are rare, and limited to certain atmospheric conditions.

WIND VELOCITY AND OCEAN WAVES.

In connection with a study of ocean waves[3] Dr. Vaughn Cornish has prepared a table showing the relation between their height and the velocity of the wind. Taking tables previously published by Desbois, Antoine, and Paris, in which

[1] Monthly Weather Review, April, 1903, vol. 31, p. 177.

[2] Comptes Rendus, June 27, 1904, vol. 138, p. 1736.

[3] On the dimensions of deep-sea waves and their relation to meteorological and geographical conditions. The Geographical Journal, London, May, 1904, vol. 23, p. 623–645.

the wind force is estimated on scales of 0-8 or 0-11, he has reduced them all to the uniform Beaufort scale of 0-12, and has converted this into miles per hour by the table of R. H. Curtis. The resulting table is based on the averages of many hundreds of observations in all parts of the globe, and gives the height in feet of ocean waves corresponding to eighteen different wind velocities, from 2 miles to 61.8 miles. It is found that in the open sea the height of the wave in feet is, in general, one-half of the velocity of the wind in statute miles per hour. There are extreme variations from this ratio of about 20 per cent. We can not determine, from the figures given, how closely the individual observations for each velocity would agree with the general average. No close approximation to accuracy should be expected if we take into account the uncertainties in the measurement of both of the quantities considered, and remember, also, that the waves of one storm are more or less affected by those of its predecessor.

The duration of the wind has less effect than might be anticipated upon the height of the wave. The latter soon attains its maximum under a constant wind, whose further effect is to increase the length of the wave rather than its height. "The best record of this is given by Paris, who observed, to the east of the Cape of Good Hope, during strong west winds which blew with great regularity for four days, that the height of the waves increased only from 19.69 to 22.97 feet, whilst the length, which was only 370.74 feet on the first day, had attained to 771 feet on the fourth. It is, indeed, in their great wave length and almost perfect parallelism that the waves of the southern ocean differ most from those of the North Atlantic and North Pacific, where the winds veer more rapidly."—*F. O. S.*

RECORD OF DROUGHTS AT RALEIGH, N. C.

[*From the* Report for September, 1904, North Carolina Section of the Climate and Crop Service of the Weather Bureau.]

The long drought now prevailing in central North Carolina, which has lasted at Raleigh from September 21 to October 12, 1904, a period of twenty-two consecutive days without precipitation, lends interest to the previous records of drought at Raleigh, since it comes near breaking all precedents. In the former years (since 1887) Raleigh has experienced a drought of equal or slightly longer duration only twice, namely, from September 15 to October 6, 1895 (twenty-two days), and from April 28 to May 20, 1903 (twenty-three days). There have been, however, ten periods of drought lasting fifteen days, two periods lasting sixteen days, two lasting eighteen days (November 23 to December 9, 1888, and January 1 to 18, 1902), and two periods lasting nineteen days (November 18 to December 6, 1890, and September 4 to 22, 1897).

A careful calculation of all consecutive days without precipitation (traces not counted as precipitation) from 1887 to 1903 shows that the average number of consecutive dry days at Raleigh is four. The average was only three in 1891, 1894, 1898, and 1899, and was as much as five only in 1896.

CORRIGENDA.

MONTHLY WEATHER REVIEW for August, 1904, p. 361, Table 3, square 66, February; for "15" read "18."

A PACK TRAIL ON MOUNT WHITNEY.

In the MONTHLY WEATHER REVIEW for November of last year, p. 524, Prof. Alexander G. McAdie gives his computation of the altitude of Mount Whitney, with a report on its availability as a site for a meteorological observatory. He concludes that it is better adapted to this purpose than any of the other extremely high peaks on the Pacific coast. Under date of August 1, 1904, Professor McAdie writes:

I am anxious to expose a minimum thermometer on the summit of Mount Whitney, so that the lowest temperature during the coming winter at this great elevation may be obtained. It will be remembered that some experiments were made in the winters of 1897-98 and 1898-99 at Mount Lyell, elevation 13,040 feet. The minimum temperatures recorded during the two seasons were respectively —25.3° C. and —27.6° C. These were not the lowest temperatures recorded elsewhere in California during those winters.

It is thought we should make every effort to utilize the opportunity for study of atmospheric conditions in these high levels in view of the importance of the data in connection with new theories of formation and structure of cyclones and anticyclones.

I inclose copy of a letter received from Mr. G. F. Marsh, Lone Pine, Cal., relative to the completion of a pack trail to the summit of Mount Whitney. This is a matter of some importance, as it will now be possible during July and August to send supplies to the summit of Mount Whitney, elevation 14,515 feet, and so far as known the highest point in the United States, excluding Alaska.

Regarding the completion of the trail, Mr. Marsh writes to Professor McAdie:

I am very glad to inform you that we completed the pack trail to the summit of Mount Whitney last Sunday, the 18th. We had three pack trains loaded with wood, and one saddle horse. We had a large fire at night, and fireworks which were plainly seen at Lone Pine, who responded with a large fire and fireworks.

We had an ideal day to finish the trail. The weather was perfect. We were so anxious to get to the top that we never noticed the altitude. Most of the time it was bitter cold and windy. We were all fearfully sunburned; our faces were a sight and our lips almost black; but we would not give in. The pack train had no difficulty at all in climbing the mountain. The trail is in good shape and parties are going over it every day. We shall try to find some means of keeping the trail in good repair.

I think the trail will be open until about Christmas unless early storms come, but it would not be safe to say this, as we do not know how early the snow will come this year. Last year there was very little snow. But I think parties will be safe until the end of October.

In a subsequent letter, Mr. Marsh refers to a snowstorm on August 1 that compelled a party to turn back within a half mile of the monument. "The mountains are covered with a light snow now, but it melts quickly."

On October 10 Mr. W. E. Bonnett, Assistant Observer at Independence, Cal., attempted to reach the summit of Mount Whitney for the purpose of installing maximum and minimum thermometers. He was accompanied by a guide, with a pack animal and saddle animal. At an altitude of 10,000 feet snow began to fall. They proceeded about 1000 feet further, when the high wind and dense snow, which was fast blotting out the trail, compelled them to turn back.

On July 26, eight days after the completion of the trail, one man was killed by lightning at the summit during a sudden snowstorm, and two of his companions were rendered unconscious. The Redland Facts records a similar occurrence on July 24 on Mount San Gorgonio, at an elevation of 9500 feet, the first case of the kind in the history of the county. Referring to these fatalities, Professor McAdie says:

The accidents have a scientific interest in that there are but few records of deaths by lightning in this State. But it should be noted that comparatively few people have been exposed to storms at high elevations. Mr. Byrd Surby was killed on the summit of Mount Whitney, within 50 feet of the monument. It was snowing at the time of the accident. It is probably not well known that the variations in the electrical potential of the air during a snowstorm are almost as rapid and as great as those prevailing during a thunderstorm. In this present case I am inclined to think that the electrical disturbance was not localized, but simply incidental to a disturbed field which extended well over the high Sierra, Inyo, Panamaint, and Telescope ranges. Also the San Bernardino Range, and probably the mountains of Arizona. This condition lasted perhaps a fortnight.

We are indebted to the Sierra Club for the accompanying illustrations, Plates 1 and 2, which are taken from the Sierra Club Bulletin. They will give some idea of the contour of Mount Whitney and the character of its approaches.—*F. O. S.*